REMARKS

Reconsideration of this patent application is respectfully requested in view of the foregoing amendments, and the following remarks.

With regard to the previous Restriction Requirement, it is pointed out that both the PCT application and the European application have been classified in IPC B01J 37/00, i.e. a class which comprises general catalytic processes. This corresponds to present claims 2 and 16 which are clearly geared towards a process for the selection of catalysts, which process is independent of whether an inorganic or an organometallic catalyst is selected. The aim of the present claims clearly is to develop a universally applicable strategy in the field of heterogenic catalysts, and to select effective catalysts from among a huge number of possible combinations. This makes it necessary to carry out the reaction steps of the present invention as specified in claims 2 and 16.

Contrary to the Examiner's opinion, it is believed that the present invention is directed to a unitary inventive concept, and that a search for all three Groups I, II, and III is believed to be reasonable and is respectfully requested.

Also the International Search Authority did not see any problem in determining relevant prior art documents by searching the state of the art.

Therefore claim 16 has been combined with claim 2 to form a new claim 17 and there is now a discussion to discuss the invention on the basis of this new claim 17.

The Examiner in the Office Action states on page 3 item 1: "...inorganic materials can neither be randomly nor arbitrarily crossed or mutated as they are non living materials." This is respectfully traversed as follows.

It is known in the state of the art to transfer the genetic algorithm from the field of living materials to non living materials. The inventors of the present invention show that it is also possible to transfer crossing and mutation to the field of heterogenic catalysis under special circumstances and with the special steps mentioned in new claim 17. In these steps the composition of the catalyst is restricted to inorganic or organometallic components, and the steps are

i) the number n_1 of the first generation lies between 5 and 100,000;

ii) activity and/or selectivity is tested in one or more parallel reactors;

iii) a number n_2 of 1-50% of the best catalysts n_1 are selected;

iv) y_2 catalysts of the second generation are formed by substituting the catalyst components with a set probability lying between two of the n_2 selected catalysts and/or the substance amounts are varied with a specific probability;

v) n_3 catalysts which have the best results from the two preceding generations are reselected; n_3 is 1-50% of n_1;

vi) in an iterative process, a particular generation y_{n+1} is formed from the preceding generation y_n, the best catalysts from all the preceding generations (1 to n) being selected until the activity and/or selectivity is not or no longer significantly higher than preceding generations in the arithmetical mean.

For instance, EP 589 384, which is cited in the IDS filed February 28, 2001, shows that this prior art method is conceivable and therefore is a possible method for imparting the genetic algorithm on multi-component systems.

In the specific embodiment of the method in EP 589,384 the number of tests in the initial test series is associated with a corresponding number of bit strings which are subdivided into a number of segments corresponding to the number of parameters. The results obtained from the first group of tests are subject to crossover, inversion and mutation with a graded degree of probability, the bit string being substituted, reversed or randomly substituted accordingly. The generation thus obtained is reconverted into real values and tested. The method is intended, for example, for nutrient solutions for bacterial strains, that is, non-living materials. EP 589,384 therefore clearly differs from the method according to Claim 17 in that the crossing and mutation is generated on the basis of bit strings.

Consequently, even if a person skilled in the art were to have attempted to utilize the method disclosed in EP 589,384 to inorganic solid catalysts, he would not have achieved the method specified in Claim 17.

The claimed method is clearly simpler than that of EP 589,384 given that the parameters are first generated on bit strings that can be resubjected to the genetic algorithm.

This clearly shows to a person skilled in the art - a

chemist of catalysis with knowledge of usual catalyst processes and the genetic algorithm - that crossing and mutation are possible and practicable, not the least because

a) the gen pool of biologic structures corresponds to the pool of catalyst main components or doping components or support components of claim 17(a)

b) part (d) of claim 17 shows the exchange or variation or both of catalyst components or mole fractions between two selected catalysts which corresponds to crossing or mutation.

The terms "crossing" and "mutation" are defined beginning on Page 9, line 37 to p. 10, line 14 of the present Specification.

Further the Examiner states in the Office Action on page 3 item 2 "an arbitrary method cannot be random...". This is respectfully traversed as follows. An arbitrary measure can show elements of randomness. Evidence of this will now be provided in the following answer to the Examiner's question in item 3 on page 3 of the Official Action. It is arbitrary to select another catalyst component for each of the six faces of a dice, e.g. V, Fe, Ga, Nb, Mo, Ni. But if one throws the dice three times the result is random: e.g. Fe, Ga and Nb. In this way one has the first components of a catalyst: Fe_t, Ca_y Nb_z O_x.

The same is valid for the mole fractions. The mole fractions on each face of the dice are determined arbitrarily: 0.02, 0.27, 0.19, 0.36, 0.77, 0.79. Throwing the dice three times leads to 0.79, 0.02 and 0.19. One receives the first catalyst: $Fe_{0.79}Ga_{0.02}Nb_{0.19}O_x$ for a selected chemical reaction, e.g. oxidative dehydrogenation of propane. The pool of chemical elements was arbitrarily limited before to e.g. 13 elements: V, Mo, Mn, Fe, Zn, Ga, Ge, Nb, W, Co, In, Ni, Cd. More subtle than this method is the use of a numerical random-check generator according to claim 3 which generator is preferred.

In any case, by using selection methods such as the throwing of dice, or preferably by using a random-check generator, a person skilled in the art will be able to obtain a list of catalysts such as demonstrated in Table 4 on pages 18 to 19 of the present Specification.

With regard to item 4 on Page 4 of the Office Action, it is agreed with the Examiner that many of the catalysts may possibly not be active or selective. This will be shown by experimental results. However, three-component catalysts may become active by adding a fourth doping element or by changing the support material. This possibility is also within the scope of the present invention.

With regard to item 5 on page 4 of the Office Action, the Examiner alleges that analyzing methods are not recited in the claim. As mentioned before, the present invention is directed to a basic invention in the field of heterogenic catalysis. Any catalysis chemist skilled in the art will be able to name one or more analytical methods or else to find these methods in the "Handbook of Heterogenic Catalysis, ed. G. Ertl, H. Knözinger, J. Weitkamp, Wiley - VCH 1997" or any other standard reference book, (e.g. in the Handbook the chapter "Ancillary techniques in laboratory units for catalyst testing", pages 1377-1386). The analytical method for the determination of the catalytic activity may depend on the kind of selected chemical reaction to be catalyzed. In general this will be the percentage of the yield expected.

A copy of Pages 1377 to 1386 of this Handbook and PTO Form 1449 listing these Pages is enclosed.

The present invention on page 13, lines 36-39 and page 20, lines 12-14 of the Specification mentions the yield in % for the dehydrogenation of propane and gas chromatography and mass spectroscopy as analytical methods. This seems sufficient for any person skilled in the field of heterogenic catalysis. Therefore an amendment to clarify the disclosure to provide a

comparison for the Patent Examiner is believed to be not required.

For all these reasons, it is respectfully submitted that the present Specification, and all the claims, are now in complete compliance with all the requirements of 35 U.S.C. 112. Withdrawal of this ground of rejection is respectfully requested.

A prompt notification of allowability is respectfully requested.

Respectfully submitted,

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Enclosures: Copy of Pages 1377 to 1386 of Handbook
PTO Form 1449

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